Klinikum rechts der Isar

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Impaired CSF activity by sevoflurane in humans – both during and after anaesthesia

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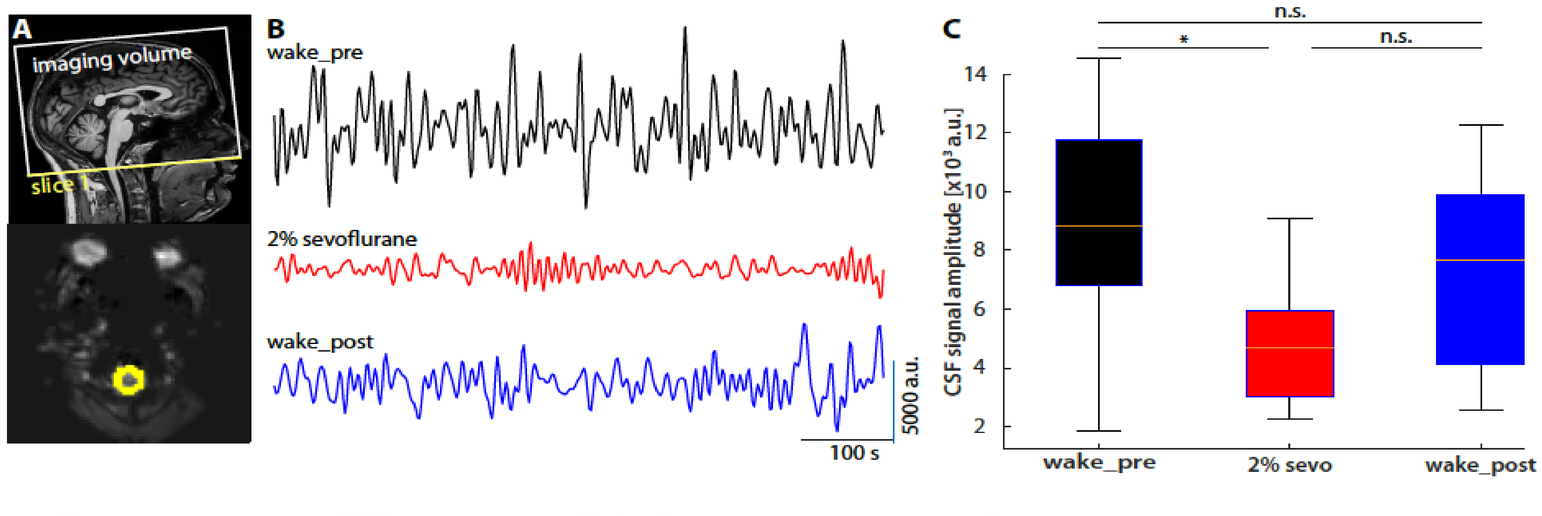
Introduction

- Animal research demonstrates that distinct anaesthetics have different effects on various variables of the CSF system[1]
- **Research Question:** what are the effects of sevoflurane on macroscopic CSF flow and its driver coherent global grey matter (gGM) activity **in humans** – both during and after anaesthesia

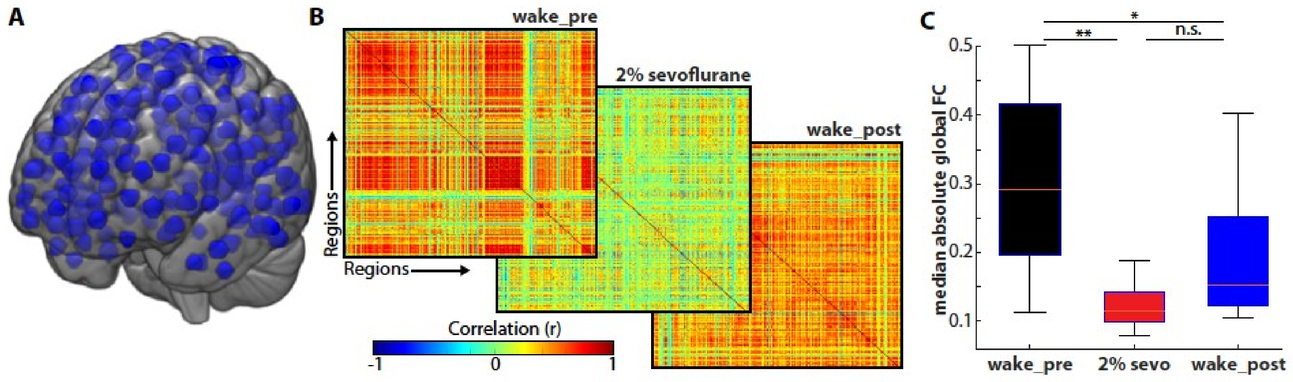
Methods:

- 16 healthy subjects
- Functional MRI before, during (2% sevoflurane), and 45 min. after sevoflurane mono-anaesthesia

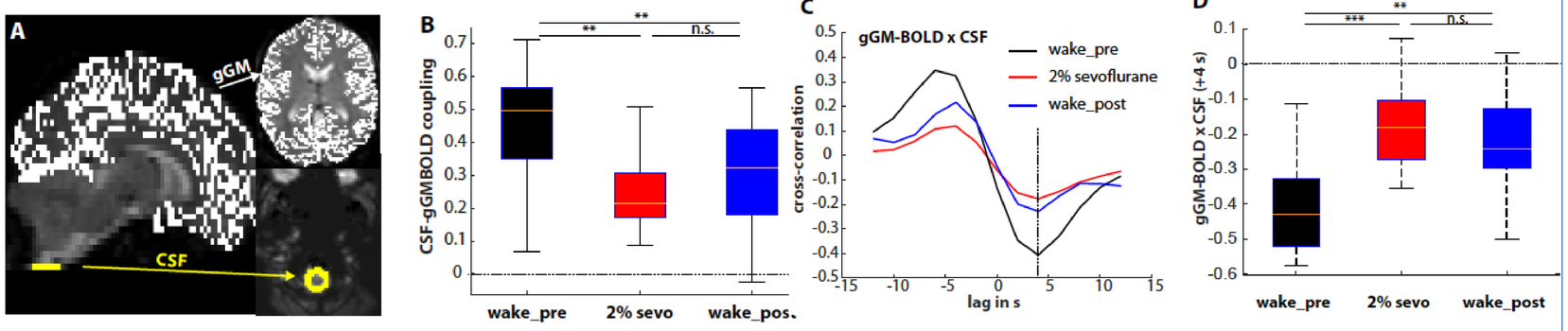
Result 1: CSF amplitude in the fourth ventricle



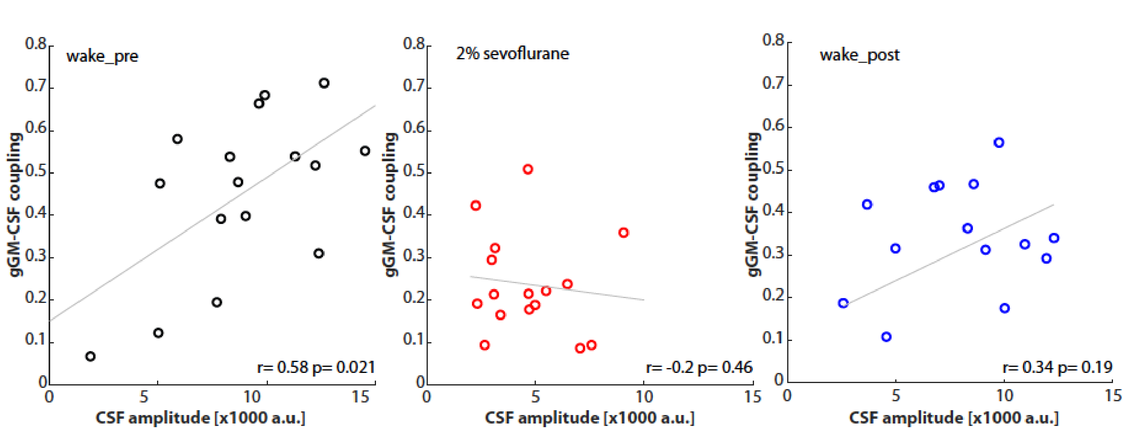
Result 2: gGM coherence



Result 3: coupling between gGM activity and CSF[2]



Result 4: gGM-CSF coupling and CSF amplitude



Conclusion:

- Sevoflurane impairs macroscopic CSF flow via a disruption of coherent gGM activity with lasting post-anaesthesia effects.
- This may play a role for perioperative neurocognitive disorders such as delirium, particularly in older patients or neurodegeneration

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(1) Benveniste, H., et al., *Anesthesia with Dexmedetomidine and Low-dose Isoflurane Increases Solute Transport via the Glymphatic Pathway in Rat Brain When Compared with High-dose Isoflurane.* Anesthesiology, 2017. **127**(6): p. 976-988.
(2) Fultz, N.E., et al., *Coupled electrophysiological, hemodynamic, and cerebrospinal fluid oscillations in human sleep.* Science, 2019. **366**(6465): p. 628-631.

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